



Soil Analysis of the Thumbikulama Cascade

Healthy Landscapes Project

2024

Soil Analysis of the “Thumbikulama” Cascade

The soil analysis was carried out in the interceptor (Kattakaduwa) of the tanks. The study was limited to interceptors as the “Yala” season has begun and farmers have started to apply chemical fertilizers.

Soil samples were obtained in the interceptor to represent the different micro ecosystems namely, dry part, alternate dry and wet part, wet part and submerged sections of the interceptor.

Sampling was done using the standard soil augers. The interceptor was drawn and divided into grids and samples were obtained to make a representative sample.

Tank	Availability of Interceptor
Bulana	No
Thumbikulama	Yes
Galkadawala	Yes
Kayan	No
Pattiya	No / occasional

Except for the Thumbikulama and Galkadawala tanks, the interceptor has been cultivated by farmers. So, the soil samples were obtained only from the above two tanks. These two tanks had a prominent interceptor.

Methodology

Measuring the pH of the sample

A clean and dry 100 ml beaker was taken. 10g of soil to be tested (with organic matter content less than 10) was added to the beaker. 50 ml of distilled water was added to the soil. The mixture was stirred vigorously for about 30 minutes at 10 minutes intervals. The suspension was allowed to stand for about one minute until the large particles settled to the bottom. The pH of the resulting solution was then measured using a pH meter.

Measuring the Electrical Conductivity of the sample

A clean and dry 100 ml beaker was taken. 10g of soil to be tested which is the organic matter content is <10. 50 ml of distilled water was added. The mixture was stirred vigorously for about 30 minutes. The suspension was allowed to stand for about one minute until the large particles settled to the bottom. EC reading and temperature of the soil solution was noted.

Interpretation:

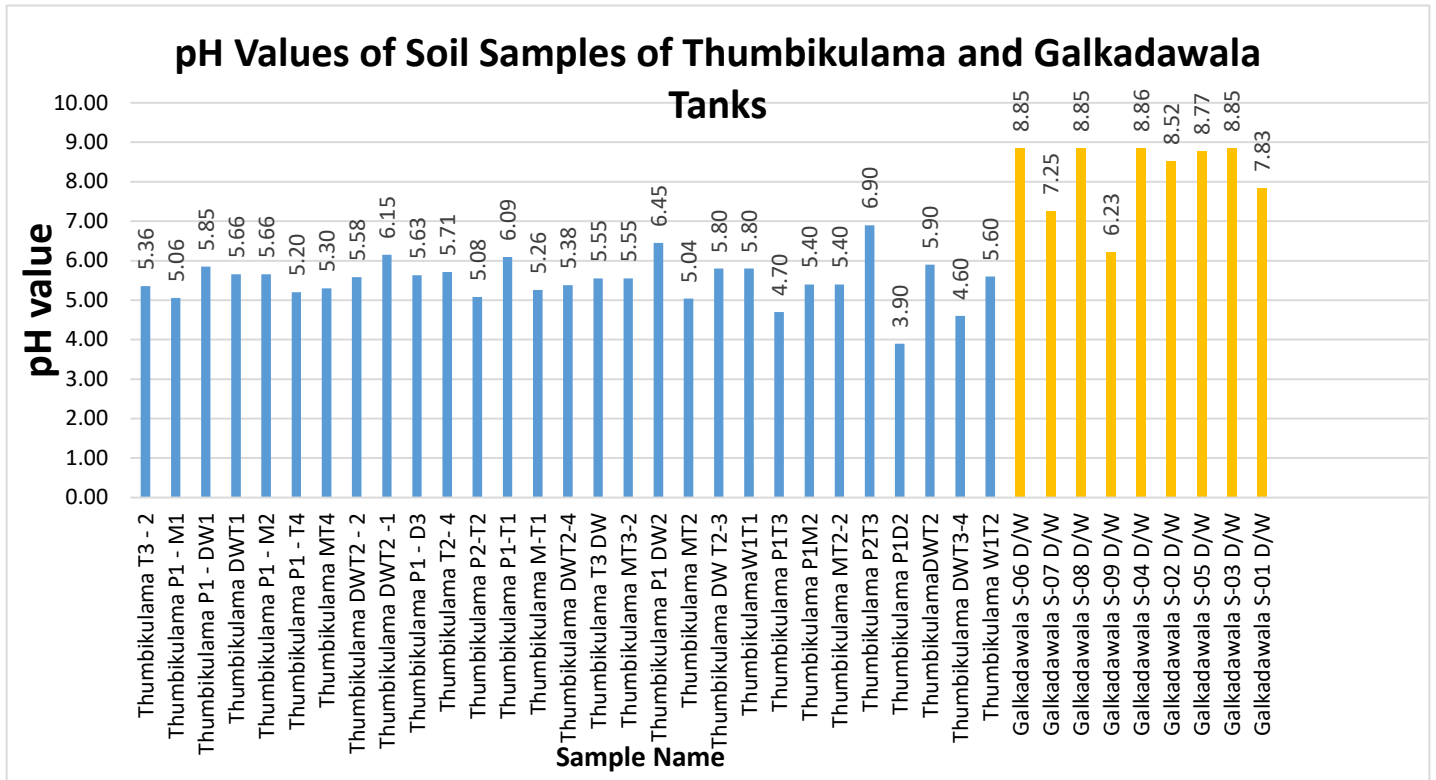
Relative level	EC (m moh/cm or ds/m) in 1:5 Soil Water Suspension
Very Low	<0.15
Low	0.15-0.4
Medium	0.8- 2.0
High	>1.5
Very high	>2

(Rayment, G.E and Higginson, F.R 1992)

Soil Salinity Class	EC (dS/m)	Effect on crop
Non Saline	<2	Salinity effect negligible
Slightly Saline	2-4	Yields of sensitive crops may be restricted
Moderately Saline	4-8	Yields of many crops are restricted
Strongly Saline	8-16	Only tolerant crops yield satisfactory
Very strong Saline	>16	Only a few tolerant crops yield satisfactory

(Piper, 1942)

Results and Discussion



The graph displays the pH values of various samples in the Thumbikulama and Galkaduwala tanks. Here's a detailed analysis comparing the two tanks. There are 29 samples in the Thumbikulama tank. And also 9 samples in the Galkaduwala tank. The pH values in the Thumbikulama tank range from approximately 4.0 to 6.0.

Distribution of pH Values:

- Most samples in the Thumbikulama tank have pH values between 5.0 and 6.0.
- Some notable samples with higher pH values (closer to 6.0) include:
 - Thumbikulama T3-2
 - Thumbikulama P2-2
 - Thumbikulama D3

- Samples with lower pH values (closer to 4.0) include:
 - Thumbikulama DWT2-2
 - Thumbikulama P1D2
- Several samples have pH values around the 5.0 mark, such as:
 - Thumbikulama P1-M1
 - Thumbikulama P1-DW1
 - Thumbikulama P1-W1
 - Thumbikulama P1-M2
 - Thumbikulama P1-T4
 - Thumbikulama MT4
 - Thumbikulama DWT2-1

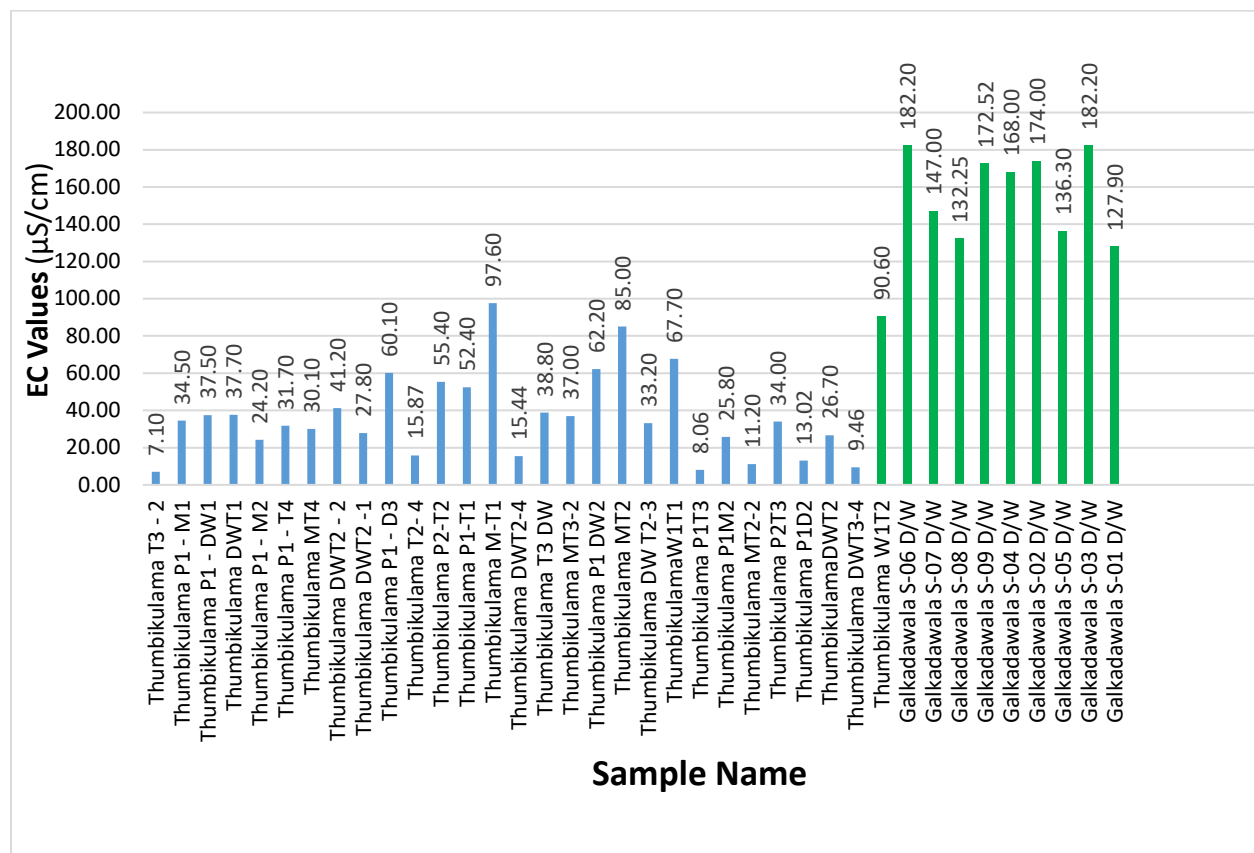
While there is some variability, many samples maintain a pH level in the range of 5.0 to 5.5. Samples like Thumbikulama P2-T4, Thumbikulama P1-T2, and Thumbikulama P1-T1 also fall within this middle range. The Thumbikulama cascade (blue bars) exhibits a range of pH values primarily between 4.0 and 6.0, with most samples clustering around the 5.0 to 5.5 range. There are a few samples with higher and lower pH values, but overall, the pH values suggest that the soil is mildly acidic to neutral in the majority of the samples. The Galkaduwala tank (yellow bars) exhibits very consistent pH values across all its samples, ranging from 7.5 to 8.0. This narrow range suggests stable water conditions that are slightly alkaline. Unlike the Thumbikulama tank there is little variation among the samples, which indicates uniform soil condition in terms of pH across the Galkaduwala tank.

Comparison

- **pH Range:** The Thumbikulama tank has a broader range of pH values (4.0 to 6.0), while the Galkaduwala tank has a more concentrated range of pH values (7.5 to 8.0).
- **Acidity/Alkalinity:** Samples in the Thumbikulama tank are generally more acidic (pH < 7), whereas samples in the Galkaduwala tank are slightly alkaline (pH > 7).
- **Consistency:** The pH values in the Galkaduwala tank are more consistent compared to the more varied pH values in the Thumbikulama tank.

This suggests that the Galkaduwala tank is more stable and alkaline, while the Thumbikulama tank has more variability and tends towards acidic to neutral conditions.

Electrical Conductivity



The graph displays the Electrical Conductivity (EC) values of various samples in the Thumbikulama and Galkaduwala tanks. when comparing the two tanks,

Thumbikulama tank (blue bars):

The EC values for samples in the Thumbikulama tank Range from approximately 0 to 80 $\mu\text{S}/\text{cm}$.

- **Distribution of EC Values:**
 - The majority of samples have EC values below 40 $\mu\text{S}/\text{cm}$.
 - A few samples show higher EC values, such as Thumbikulama T2-D3 and Thumbikulama P1D2, reaching up to around 80 $\mu\text{S}/\text{cm}$.
 - There is a noticeable variability in EC values among the samples, indicating a range of mineral content or salinity levels.
 - Most samples show EC values clustering between 20 and 60 $\mu\text{S}/\text{cm}$.

Galkaduwala Tank (green bars):

The EC values for samples in the Galkaduwala tank range from approximately 100 to 200 $\mu\text{S}/\text{cm}$.

- **Distribution of EC Values:**
 - All samples in the Galkaduwala tank have significantly higher EC values compared to those in the Thumbikulama tank.
 - The EC values are consistently high, with most samples showing values around 150 $\mu\text{S}/\text{cm}$ or higher.
 - The variability among the samples in this tank is less compared to Thumbikulama, indicating more uniform in terms of EC. Yields of sensitive crops may be restricted.

Comparison:

- **EC Range:**
 - **Thumbikulama:** 0 to 80 $\mu\text{S}/\text{cm}$.
 - **Galkaduwala:** 100 to 200 $\mu\text{S}/\text{cm}$.
- **Conductivity Levels:**
 - The samples in the Galkaduwala tank are generally more conductive, indicating higher salinity or mineral content.
- **Variability:**
 - The Thumbikulama tank exhibits more variability in EC values, suggesting a broader range salinity conditions.
 - The Galkaduwala tank shows consistently high EC values, indicating uniform higher salinity or mineralization.

The Thumbikulama tank has lower and more variable EC values, suggesting less saline or less mineralized soil compared to the Galkaduwala tank. In contrast, the Galkaduwala tank has uniformly higher EC values, indicating more saline or more mineralized conditions. Only tolerant crops yield satisfactory under this condition. This difference highlights distinct characteristics between the two cascades, with the Galkaduwala tank showing higher and more consistent levels of electrical conductivity.

Reference

Piper, CS 1942, Soil and Plant Analyses. University of Adelaide.

Rayment, GE & Higginson, FR 1992, Australian Laboratory Handbook of Soil and Water Chemical Methods, Melbourne, Inkata Press. (Australian Soil and Land Survey Handbooks, vol 3)